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EXAMINER	
PEREZ DAPLE, AARON C	
ART UNIT	**PAPER NUMBER**
2154	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Applicati n No.	Applicant(s)	
	09/915,188	DUTE ET AL.	
	Examiner	Art Unit	
	Aaron C Perez-Daple	2154	

-- The MAILING DATE of this c mmunication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *30 August 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *2,3,5-7,9-62 and 64-85* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *2,3,5-7,9-62 and 64-85* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. This Action is in response to RCE filed 8/30/04, which has been fully considered.

2. Amended claims 2, 3, 5-7, 9-62, 64-82 and new claims 83-85 are presented for examination.

3. Claims 1, 4, 8 and 63 are cancelled by Applicant.

4. This Action is non-Final.

Specification

5. The amendment filed 8/30/04 is objected to under 35 U.S.C. 132 because it introduces new matter into the disclosure. 35 U.S.C. 132 states that no amendment shall introduce new matter into the disclosure of the invention. The added material which is not supported by the original disclosure is as follows: independent claims 45 and 83 recite "operation mode circuits that *automatically sense whether said sensor or said actuator* is connected to said interface and, subsequently, *automatically* and directly provide different signal type input or output functions (emphasis added)." Independent claim 6 recites, "an *automatic* operation selector selecting said operation (emphasis added)." These limitations have not been enabled by the disclosure as originally filed..

Applicant is required to cancel the new matter in the reply to this Office Action.

Claim Rejections - 35 USC § 112

6. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it

pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

7. **Claims 2, 3, 5, 6, 7, 9-43, 45-48 and 52-85** are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Specifically, independent claims 45 and 83 recite "operation mode circuits that *automatically sense whether said sensor or said actuator* is connected to said interface and, subsequently, *automatically* and directly provide different signal type input or output functions (emphasis added)." This limitation has not been enabled by the application as originally filed. Claim 6 recites, "an *automatic* operation selector selecting said operation (emphasis added)." This limitation has not been enabled by the specification as originally filed.

Although the disclosure is enabling for a plurality of operation modes which may be configured for providing different input or output functions, nowhere does it disclose automatically sensing whether a sensor or actuator is connected to said interface. Nor does it disclose automatically selecting the operation. Rather the configuration is disclosed as performed by a user and supplied to the interface by a controller. See pg. 4, lines 20-24 and pg. 7, lines 1-5.

8. As dependent claims, claims 2, 3, 5, 7, 9-43, 46-48, 52-82, 84, and 85 suffer from the same deficiencies as their parent claims.

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

10. **Claims 2, 3, 5-7, 9-51, 53, 55, 58-62, 79, 81 and 83** are rejected under 35 U.S.C. 103(a) as being anticipated by McLeish et al (US 5,014,238) (hereinafter McLeish) in view of Sitte (US 5,469,150).

11. As for claim 6, McLeish discloses an electrical input and output (I/O) interface comprising:

a first port for coupling said interface to a first external device (col. 4, lines 30-34, "A field device 4...or field device 4.");

a second port for coupling said interface with a second device (col. 4, lines 30-34, "A field device 4...or field device 4.");

an operating circuit communicating with a first signal set at said first port and communicating a second signal set at said second port and performing an operation on one of said first signal set and said second signal set as an input and generating the other one of said first signal set and said second signal set as an output (col. 4, lines 30-58, "A field device 4...of keyboard 10."; col. 5, lines 25-28, "The input-output device...referred to above."); and

an automatic operation selector selecting said operation performed directly by said operating circuit from among a plurality of operations internal to said interface (col. 5, lines 25-68, "The input-output device...base and the span.").

McLeish does not specifically disclose a first port having only first and second terminals for exclusively coupling an interface to a first external device. Sitte teaches a sensor having two terminals (col. 1, lines 39-54, "U.S. Pat No....over a wide range."). Such a sensor would inherently be coupled to a control circuit through only two terminals (e.g. first and second terminals). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify McLiesh by providing a first port with only first and second terminals for exclusively coupling the interface to a first external device, because this would allow for coupling with a two-terminal sensor such as that disclosed by Sitte.

12. As for claim 7, McLeish discloses the interface of claim 6, wherein said interface is a comprehensive universal configurable interface for interfacing a multiplicity of analog, digital, voltage and current based signals over a multiple orders of magnitude signal range between a controller and a transducer (col. 4, lines 30-55, "A field device...referred to above.").

13. As for claims 9-13, McLeish discloses the interface in claim 6, wherein said first external device comprises either a sensor or an actuator of a machine or process and said sensor or actuator are used to monitor or control said machine or process (col. 5, lines 25-68, "The input-output device...base and the span.").

14. As for claim 14, McLeish discloses the interface in claim 6, wherein said first external device comprises a sensor generating a voltage signal (col. 5, lines 51-57, "Define the sensor...-current.").

15. As for claim 15, McLeish discloses the interface in claim 6, wherein said first external device comprises a sensor generating a current signal (col. 5, lines 51-57, "Define the sensor...-current.").

16. As for claim 16, McLeish discloses the interface in claim 6, wherein said second device comprises an external controller (MP 3, Fig. 2).

17. As for claim 17, McLeish discloses the interface in claim 6, wherein said second device consists of a controller and an isolation circuit interposed between said interface and an external controller (col. 5, lines 49-58, "The signal conditioning...of keyboard 10.").

18. As for claims 18-20, McLeish discloses the interface in claim 6, wherein said second port includes a third terminal for communicating data, control or commands, and clock (col. 4, lines 30-55, "A field device...referred to above.").

19. As for claim 21, McLeish does not specifically disclose the use of a fifth terminal. However, McLeish discloses the use of multiple terminals for communicating data, communicating control or commands and for communicating clock (col. 4, lines 30-55, "A field device...referred to above."). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify McLeish to include five terminals, the third terminal for communicating data, the fourth terminal for communicating control or commands and the fifth terminal for communicating clock, because this is one of several known and obvious design choices.

20. As for claim 22, McLeish discloses the interface in claim 6, wherein said operating circuit including a plurality of different operating mode circuits (col. 4, lines 9-22, "The input-output device...also be utilized.").

21. As for claim 23, McLeish discloses the interface in claim 6, wherein said operating circuit includes means for configuring said operating circuit in a particular mode of operation (col. 5, lines 25-68, "The input-output device...base and the span.").

22. As for claim 24, McLeish discloses the interface in claim 23, wherein said mode of operation selected from the set of operating modes consisting of a digital input signal mode, a digital output signal mode, an analog input signal mode, an analog output signal mode, and combinations thereof (col. 4, lines 30-55, "A field device...referred to above.").

23. As for claim 25, McLeish discloses the interface in claim 23, wherein said mode of operation selected from the set of operating modes consisting of a Mode 1 operating mode, a Mode 2 operating mode, a Mode 3 operating mode, a Mode 4 operating mode, a Mode 5 operating mode, a Mode 6 operating mode, a Mode 7 operating mode, and combinations thereof (col. 5, lines 25-68, "The input-output device...base and the span.").

24. As for claim 26, McLeish discloses the interface in claim 6, wherein said operation selector selects an operating mode from among a plurality of defined modes of operation (col. 5, lines 25-68, "The input-output device...base and the span.").

25. As for claim 27, McLeish discloses the interface in claim 6, wherein said operation selector comprising a microcontroller (col. 4, lines 9-22, "The input-output device...also be utilized.").

26. As for claim 28, McLeish discloses the interface in claim 6, wherein said operation selector comprising a microcontroller coupled with at least one analog-to-digital converter for converting analog signals to digital signals for processing by said microcontroller (col. 1, lines 36-47, "Furthermore, U.S. Pat...and digital signals.")

27. As for claim 29, McLeish discloses the interface in claim 6, wherein said operation selector microcontroller having a plurality of control lines for receiving input signals and a plurality of output signals to influence the operation performed by said operating circuit (Fig. 1; col. 4, lines 30-55, "A field device...referred to above.").

28. As for claim 30, McLeish discloses the interface in claim 6, wherein said plurality of operations including a digital input signal mode, a digital output signal mode, an analog input signal mode, an analog output signal mode, and combinations thereof (col. 4, lines 30-55, "A field device...referred to above."; col. 5, lines 25-68, "The input-output device...base and the span.").

29. As for claim 31, McLeish discloses the interface in claim 6, wherein said plurality of operations including a mode of operation selected from the set of operating modes consisting of a Mode 1 operating mode, a Mode 2 15 operating mode, a Mode 3 operating mode, a Mode 4 operating mode, a Mode 5 operating mode, a Mode 6 operating mode, a Mode 7 operating mode, and combinations thereof (col. 5, lines 25-68, "The input-output device...base and the span.").

30. As for claim 32, McLeish discloses the interface in claim 6, wherein said operation selector is operative to activate portions of said operating circuit and to deactivate portions of said operating circuit to define an active circuit that performs a selected operation (col. 4,

lines 30-55, "A field device...referred to above."; col. 5, lines 25-68, "The input-output device...base and the span.").

31. As for claim 33, McLeish discloses the interface in claim 6, wherein said operating circuit comprises a plurality of modular circuits each for performing a predetermined signal processing function with respect to input signals and output signals, and said operation selector being operative to activate ones of said modules and to deactivate other ones of said modules to define one or more active modules that performs a selected operation (col. 4, lines 9-22, "The input-output device...also be utilized."; col. 5, lines 25-68, "The input-output device...base and the span.").

32. As for claim 34, McLeish discloses the interface in claim 6, wherein said operation selector is operative to activate said modules to process a signal of a particular signal type (col. 4, lines 30-55, "A field device...referred to above."; col. 5, lines 25-68, "The input-output device...base and the span.").

33. As for claim 35, McLeish discloses the interface in claim 6, wherein said particular signal type comprises either an input signal type or an output signal type or both (col. 4, lines 30-55, "A field device...referred to above.").

34. As for claim 36, McLeish discloses the interface in claim 6, wherein said interface communicates an output command to one of said first or second device commanding said external device to operate in a status corresponding to said command; and monitoring the actual operating status of said external device; said actual operating status being the same or different from the commanded status (col. 5, lines 34-56, "Means 20 for generating...gallons per minute.").

35. As for claims 37-39, McLeish discloses the interface in claim 6, wherein one of said first and second device comprises an actuator and the other of said first and second device comprise a sensor (col. 5, lines 25-68, "The input-output device...base and the span.").

36. As for claims 40 and 41, McLeish discloses the interface in claim 6, wherein said interface further comprising input current detection means for directly detecting a sensor current rather than detecting sensor voltage determine sensor state to thereby reduce the effects of induced electrical noise appearing on sensor voltage on conductors coupling said sensor to said interface (col. 4, lines 30-55, "A field device...referred to above."; col. 5, lines 25-68, "The input-output device...base and the span.").

37. As for claim 42, McLeish discloses the interface in claim 6, wherein:

said interface is a comprehensive universal configurable interface for interfacing a multiplicity of analog, digital, voltage, and current based signals over a multiple orders of magnitude signal range between a controller and a transducer (col. 4, lines 30-55, "A field device...referred to above.");

said first external device comprises either a sensor or an actuator of a machine or process (col. 5, lines 25-68, "The input-output device...base and the span.");

said first external device comprises a sensor generating a voltage or a current signal (col. 5, lines 25-68, "The input-output device...base and the span.");

said second device comprises a controller and an isolation circuit interposed between said interface and said external controller (col. 3, lines 64-66, "Each MP 3...input output device 2."; col. 5, lines 49-58, "The signal conditioning...of keyboard 10.");

said second port includes a third terminal for communicating at least one of data, control or commands, and clock (col. 4, lines 30-55, "A field device...referred to above.");

said operating circuit includes a plurality of different operating mode circuits, and said operating circuit includes means for configuring said operating circuit to operate in a particular mode of operation (col. 4, lines 9-22, "The input-output device...also be utilized."; col. 5, lines 25-68, "The input-output device...base and the span.");

said mode of operation comprises a digital input signal mode, a digital output signal mode, an analog input signal mode, an analog output signal mode, or combinations thereof (col. 4, lines 30-55, "A field device...referred to above."; col. 5, lines 25-68, "The input-output device...base and the span.");

said operation selector comprises a microcontroller coupled with at least one analog-to--digital converter for converting analog signals to digital signals for processing by said microcontroller (col. 1, lines 36-47, "Furthermore, U.S. Pat...and digital signals.");

said operation selector being operative to activate portions of said operating circuit and to deactivate other portions of said operating circuit to define an active circuit that performs a selected operation (col. 4, lines 30-55, "A field device...referred to above."; col. 5, lines 25-68, "The input-output device...base and the span.").

38. As for claim 43, McLeish discloses the interface in claim 6, wherein:

said operating circuit comprising a plurality of modular circuits each for performing a predetermined signal processing function with respect to input signals and output signals, and said operation selector being operative to activate ones of said modules and to deactivate other ones of said modules to define one or more active modules that performs a selected

operation (col. 4, lines 30-55, "A field device...referred to above."; col. 5, lines 25-68, "The input-output device...base and the span.");

said operation selector being operative to activate said modules to process a signal of a particular signal type (col. 4, lines 30-55, "A field device...referred to above."; col. 5, lines 25-68, "The input-output device...base and the span.");

said interface further comprising input current detection means for directly detecting a sensor current rather than detecting sensor voltage determine sensor state to thereby reduce the effects of induced electrical noise appearing on sensor voltage on conductors coupling said sensor to said interface (col. 4, lines 30-55, "A field device...referred to above."; col. 5, lines 25-68, "The input-output device...base and the span.").

39. As for claims 53 and 55, McLeish discloses the interface in claim 6, wherein said interface further comprising a protection circuit for reducing damage to said interface or to said first device or said second device that would otherwise result in damage to said interface as a result of misconnecting or miswiring said interface to one of said first or second external devices (col. 4, lines 49-58, "The signal conditioning...of keyboard 10.").

40. As for claims 58 and 59, McLeish discloses the interface in claim 55, wherein said interface further comprising input current detection means for directly detecting a sensor current rather than detecting sensor voltage determine sensor state to thereby reduce the effects of induced electrical noise appearing on sensor voltage on conductors coupling said sensor to said interface (col. 4, lines 30-55, "A field device...referred to above."; col. 5, lines 25-68, "The input-output device...base and the span.").

41. As for claims 60 and 62, McLeish discloses the interface in claim 6, wherein said interface further comprising means for measuring power, both real and imaginary, by dynamically switching between voltage measurements and current measurements (col. 5, lines 25-68, "The input-output device...base and the span.").

42. As for claim 61, McLeish discloses the interface in claim 6, wherein said interface further comprising: a voltage measuring circuit and a current measurement circuit each coupleable to a load, a switching circuit for dynamically switching between said voltage measurement circuit and said current measurement circuit; said combination of voltage measurements and said current measurements permitting measurement of power consumed by said load (col. 5, lines 25-68, "The input-output device...base and the span.").

43. As for claim 79, McLeish discloses the interface in claim 6, wherein said interface is formed as a single integrated device within a common enclosure (input-output device 2, Fig. 2).

44. As for claim 81, McLeish discloses the interface in claim 6, wherein said selectable operation of said interface to inter-operate with a plurality of different sensors, actuators, and other transducers materially reducing design and engineering time associated with designing, assembling, and debugging operation of a system including said interface (col. 2, lines 1-14, "Present digital...or output signals.").

45. As for claim 44, McLeish discloses an electrical input and output (I/O) interface comprising:

a first port connecting said interface to only a single first external device (col. 4, lines 30-34, "A field device 4...or field device 4.");

a second port for coupling said interface with a second device (col. 4, lines 30-34, "A field device 4...or field device 4."); and

an operating circuit communicating with a first signal set at said first port and communicating a second signal set at said second port and performing an operation on one of said first signal set and said second signal set as an input and generating the other one of said first signal set and said second signal set as an output (col. 4, lines 30-58, "A field device 4...of keyboard 10."; col. 5, lines 25-28, "The input-output device...referred to above.");

said operating circuit receiving an input from an external micro-controller directing an operating circuit configuration from operating circuit configurations internal to said operating circuit (col. 3, lines 64-66, "Each MP 3 is...input output device 2.").

McLeish does not specifically disclose a first port having only first and second terminals for exclusively coupling an interface to a first external device. Sitte teaches a sensor having two terminals (col. 1, lines 39-54, "U.S. Pat No....over a wide range."). Such a sensor would inherently be coupled to a control circuit through only two terminals (e.g. first and second terminals). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify McLiesh providing a first port with only first and second terminals for exclusively coupling the interface to a first external device, because this would allow for coupling with a two-terminal sensor such as that disclosed by Sitte.

46. As for claim 49, McLeish discloses an interface comprising:

an output circuit having an interface electrically connecting said output circuit to a single external device, the output circuit communicates an output command to said single external

device to automatically operate in a state corresponding to said command (col. 3, line 67 – col. 2, line 3, "The input-output device...particularized herein."); and

a monitor circuit, internal to said interface circuit, that automatically and directly monitors the actual operating state of said single external device (col. 5, lines 25-28, "The input-output device...4 referred to above."); said actual operating state being the same or different from the commanded state (col. 6, lines 34-56, "Means 20 for generating...gallons per minute.").

McLeish does not specifically disclose a first port having only first and second terminals for exclusively coupling an interface to a first external device. Sitte teaches a sensor having two terminals (col. 1, lines 39-54, "U.S. Pat No....over a wide range."). Such a sensor would inherently be coupled to a control circuit through only two terminals (e.g. first and second terminals). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify McLiesh providing a first port with only first and second terminals for exclusively coupling the interface to a first external device, because this would allow for coupling with a two-terminal sensor such as that disclosed by Sitte.

47. As for claim 50, McLeish discloses the interface circuit in claim 49, wherein said actual operating state is different from the commanded state (col. 6, lines 34-56, "Means 20 for generating...gallons per minute.").

48. As for claim 51, McLeish discloses the interface in claim 49, wherein said state corresponds to a status (col. 5, lines 25-28, "The input-output device...4 referred to above.").

49. As for claims 45 and 83, McLeish discloses a comprehensive input/output interface circuit for interfacing a process or machine controller with a sensor monitoring a condition

within said process or machine or an actuator acting to modify said process or machine with a controller receiving inputs from said sensor or sending commands to said actuator (col. 2, lines 49-67); said interface comprising:

electrical wiring electrically connecting a single sensor or a single actuator, but not both simultaneously, to said interface circuit (col. 3, lines 46-51);

a plurality of operation mode circuits that automatically sense whether said sensor or said actuator is connected to said interface and, subsequently, automatically and directly provide different signal type input and output functions including a digital input function, a digital output function, an analog input function, and an analog output function, between said interface circuit and said sensor or actuator (col. 5, lines 25-68); and

means for the controlling activation and deactivation of different ones of said operation mode circuits to provide a selected ones of said signal type input and output functions (col. 4, lines 59 – col. 5, line 2; col. 5, lines 25-68).

Although obvious to one of ordinary skill in the art, McLeish does not explicitly disclose that the electrical wiring may comprise first and second terminals for coupling with the sensor or actuator exclusively through only said first and second electronic terminals. Sitte teaches a sensor having two terminals (col. 1, lines 39-54). Such a sensor would inherently be coupled to a control circuit through only two terminals (e.g. first and second terminals). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify McLeish by coupling with a sensor or actuator exclusively through only said first and second electronic terminals, because this would allow for coupling with a two-terminal sensor such as that disclosed by Sitte.

50. As for claims 2 and 46, McLeish discloses the interface of claims 1 and 45 wherein said means for controlling activation and deactivation includes a microcontroller (col. 4, lines 56-58).

51. As for claims 3 and 47, McLeish discloses the interface of claims 2 and 46, wherein said microcontroller is adapted to receive control signals from an external controller (MP 3, Fig. 2; col. 3, lines 64-66).

52. As for claims 5 and 48, McLeish discloses the interface of claims 1 and 45 wherein said means for controlling activation and deactivation includes a microcontroller (CPU 6, Fig. 1) that is adapted to receive control signals from an external controller (MP 3, Fig. 2; col. 3, lines 64-66).

53. As for claim 52, McLeish discloses the interface in claim 83, wherein said interface further comprising a protection circuit for reducing damage to said interface that would otherwise result in damage to said interface as a result of misconnecting or miswiring said interface to one of said sensor or said actuator (signal conditioning circuitry 18, Fig. 1; col. 4, lines 49-58).

54. As for claim 54, McLeish discloses the interface in claim 1, wherein said interface further comprising a protection circuit for reducing damage to said first device or said second device that would otherwise result in damage to said interface as a result of misconnecting or miswiring said interface to one of said sensor or said actuator (signal conditioning circuitry 18, Fig. 1; col. 4, lines 49-58).

55. As for claim 56, McLeish discloses the interface in claim 54, wherein said interface further comprising an input current detection circuit that detects the state of a sensor current

directly rather than detecting the sensor voltage to thereby reduce the effects of induced electrical noise on conductors coupling said sensor to said interface (signal conditioning circuitry 18, Fig. 1; col. 4, lines 49-58).

56. As for claim 57, McLeish discloses the interface in claim 54, wherein said interface further comprising input current detection means for directly detecting a sensor current rather than detecting sensor voltage determine sensor state to thereby reduce the effects of induced electrical noise appearing on sensor voltage on conductors coupling said sensor to said interface (signal conditioning circuitry 18, Fig. 1; col. 4, lines 49-58).

57. **Claims 64-72, 76-78 and 82** are rejected under 35 U.S.C. 103(a) as being obvious over McLeish in view of Sitte and in further view of Campau et al (US 6,206,482) (hereinafter Campau).

58. As for claims 64-66 and 68, McLeish discloses the use of signal conditioning circuitry which, as known to those skilled in the art, may include a constant current circuit (col. 4, lines 48-58, "The signal conditioning...of keyboard 10."). However, neither McLeish nor Sitte specifically disclose providing a constant current control circuit for controlling a current drawn by a load device. Campau teaches providing a constant current control circuit for controlling a current drawn by a load device, including a solenoid actuated valve (col. 2, line 58 – col. 3, line 7, "In prior art systems...the valve heating.").

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the teachings of McLeish and Sitte by adding a constant current control circuit for controlling a current drawn by a load device, in order to open or close a valve, as taught by Campau (col. 2, line 58 – col. 3, line 7, "In prior art systems...the valve heating.").

59. As for claim 67, McLeish discloses the interface of claim 66, said load device including a power level actuator in a process or machine (col. 9, lines 3-10, "The input output device...data acquisition systems.").

60. As for claim 69, McLeish discloses the interface of claim 66, wherein said load device including an inductive load component, said constant current circuit being operative to reduce electromagnetic interference (EMI) and RFA (radio frequency interference) caused by energizing or de-energizing said load device (col. 9, lines 3-10, "The input output device...data acquisition systems.").

61. As for claim 70, McLeish discloses the interface of claim 66, wherein said load device including a relay device (col. 9, lines 3-10, "The input output device...data acquisition systems.").

62. As for claim 71, McLeish discloses the interface of claim 66, wherein said load device including a solenoid valve device (col. 9, lines 3-10, "The input output device...data acquisition systems.").

63. As for claim 72, McLeish discloses the interface of claim 66, wherein said constant current circuit eliminating the need for 10 suppression circuits to suppress turn-on and turn-off mechanical shock to electromechanical devices and inductive loads (col. 9, lines 3-10, "The input output device...data acquisition systems.").

64. As for claim 76, McLeish discloses the interface of claim 66, wherein said load device including an inductive load component, 25 and said constant current circuit reducing destructive effects, both human and mechanical, of inductive L(di/dt) based transients that

occur when de-energizing inductive loads (col. 9, lines 3-10, "The input output device...data acquisition systems.").

65. As for claim 82, McLeish discloses the interface of claim 76, wherein said destructive effects include destructive mechanical effects to said inductive load containing device (col. 9, lines 3-10, "The input output device...data acquisition systems.").

66. As for claim 77, McLeish discloses the interface of claim 77, wherein said destructive effects include destructive effects on humans in the vicinity of said inductive load containing device (inherent).

67. As for claim 78, McLeish discloses the interface of claim 66, wherein said load device includes or couples with a triac controlled by a triac control circuit, and said constant current circuit reduces half-cycle time delay in energizing and de-energizing current (ac) loads that otherwise occur with triac control circuits (col. 9, lines 3-10, "The input output device...data acquisition systems.").

68. **Claims 73-75** are rejected under 35 U.S.C. 103(a) as being obvious over McLeish in view of Sitte in further view of Campau and in further view of Thomas et al (US 4,267,439) (hereinafter Thomas).

69. As for claims 73-75, neither McLeish nor Sitte specifically disclose the use of an incandescent lamp in conjunction with a constant current circuit. Thomas discloses the use of an incandescent lamp in conjunction with a constant current circuit (abstract, "Incandescent lamps are...operational lamp circuit."). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the teachings of McLeish, Sitte and Campau by providing a constant current from a constant current circuit to an

incandescent lamp, in order to extend the usable life of a controlled incandescent lamp, as taught by Thomas (abstract, "Incandescent lamps are...operational lamp circuit.").

70. **Claim 80** is rejected under 35 U.S.C. 103(a) as being obvious over McLeish in view of Sitte and in further view of Galecki et al (US 6,308,231) (hereinafter Galecki).

As for claim 80, neither McLeish nor Sitte specifically teach forming the interface on a single printed circuit substrate. Galecki teaches forming an I/O interface on a single printed circuit substrate (abstract, "According to another aspect, an integrated circuit... communication interface."). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the teachings of McLeish and Sitte by forming the interface on a single printed circuit substrate, in order to simplify fabrication of the device.

71. **Claims 84 and 85** are rejected under 35 U.S.C. 103(a) as being obvious over McLeish in view of Sitte. As for claims 84 and 85, McLeish does not explicitly disclose that the voltage range may encompass hundreds of volts. It would have been obvious to one of ordinary skill in the art at the time of the invention to modify McLeish by including a voltage range encompassing hundreds of volts in order to control a wide range of devices with different voltage requirements.

Response to Arguments

72. Applicant's arguments with respect to independent claims 83 and 45 have been considered but are moot in view of the new ground(s) of rejection.

73. Applicant's arguments filed 8/30/04 with respect to independent claims 6, 44 and 49 have been fully considered but they are not persuasive.

74. With respect to independent claims 6, 44, and 49, Applicant asserts in pgs. 39-41 of the Remarks that McLeish does not disclose electrically connecting said interface to only a single first external device. The Examiner respectfully disagrees. Although a preferred embodiment of McLeish discloses that the interface may accommodate 32 channels, McLeish specifically discloses in col. 4, lines 4-9, that the invention may be modified to accommodate any number of channels without departing from the spirit of the invention. Therefore, McLeish anticipates this limitation of the claims. The Examiner has previously admitted that McLeish does not specifically disclose connecting the device to only first and second terminals. In fact, McLeish is silent on the specifics of the wiring, stating only that suitable wiring should be chosen in col. 3, lines 46-51. However, this limitation would have been obvious in view of Sitte, as detailed in the 103(a) rejections above.

Applicant further asserts that McLeish fails to disclose "a plurality of operation circuits, which automatically, and internally to the interface, sense the operation to be performed." The Examiner respectfully disagrees. First, the Examiner notes that claim 6, in particular, actually recites, "an automatic operation selector selecting said operation performed directly by said operating circuit from among a plurality of operations internal to said interface," which is distinct from Applicant's assertion above. The Examiner finds that McLeish properly anticipates this limitation of the claims. Specifically, the signal conditioning circuitry 18 automatically senses the input or output signal, as disclosed in col. 4, lines 49-55. An operation is then automatically performed in response to the sensed signal for controlling the device, as disclosed in col. 5, lines 25-28. Indeed, the purpose of McLeish's invention is to effect automatic control of the device(s). The operations are further disclosed as stored in

internal memory of the EEPROM 8 and/or the VRAM 20. Therefore, McLeish anticipates this limitation of the claims.

For the reasons above, claims 6, 7, 9-44 and 49-51, 53, 55, 58-62, 79 and 81 are properly rejected under 35 U.S.C. 103(a) as being anticipated by McLeish et al (US 5,014,238) (hereinafter McLeish) in view of Sitte (US 5,469,150).

75. The additional claim rejections under 35 USC 103 (a) are properly maintained for the same reasons given above.

Conclusion

76. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Aaron C Perez-Daple whose telephone number is (571) 272-3974. The examiner can normally be reached on 9am-5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John Follansbee can be reached on (571) 272-3964. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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11/5/05

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